JC04 Rec'd PCT/PTO 05 FEB 2001
09/762226

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
REQUEST FOR FILING NATIONAL PHASE OF
PCT APPLICATION UNDER 35 U.S.C. 371 AND 37 CFR 1.494 OR 1.495

To: Hon. Commissioner of Patents
Washington, D.C. 20231

00909

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US)

Atty Dkt: **PM** 276662 /2980355US/VK
M# /Client Ref.

From: Pillsbury Winthrop LLP, IP Group:

Date: February 5, 2001

This is a **REQUEST** for **FILING** a PCT/USA National Phase Application based on:

1. International Application	2. International Filing Date	3. Earliest Priority Date Claimed
PCT/FI99/00652 ✓	5 August 1999 ✓	6 August 1998 ✓
⇧ country code	Day MONTH Year	Day MONTH Year (use item 2 if no earlier priority)

4. Measured from the earliest priority date in item 3, this PCT/USA National Phase Application Request is being filed within:

(a) ☐ 20 months from above item 3 date (b) ☒ 30 months from above item 3 date,

(c) Therefore, the due date (unextendable) is February 6, 2001

5. Title of Invention INTERNET/INTRANET ACCESS MECHANISM

6. Inventor(s) AALTO, Mika et al

Applicant herewith submits the following under 35 U.S.C. 371 to effect filing:

7. ☒ Please immediately start national examination procedures (35 U.S.C. 371 (f)).

8. ☐ **A copy of the International Application** as filed (35 U.S.C. 371(c)(2)) is transmitted herewith (file if in English but, if in foreign language, file only if not transmitted to PTO by the International Bureau) including:

a. ☐ Request;
b. ☐ Abstract;
c. _____ pgs. Spec. and Claims;
d. _____ sheet(s) Drawing which are ☐ informal ☐ formal of size ☐ A4 ☐ 11"

9. ☒ **A copy of the International Application has been transmitted by the International Bureau.**

10. **A translation of the International Application** into English (35 U.S.C. 371(c)(2))
a. ☒ is transmitted herewith including: (1) ☒ Request; (2) ☒ Abstract;
(3) 8 pgs. Spec. and Claims;
(4) 1 sheet(s) Drawing which are:
☐ informal ☒ formal of size ☒ A4 ☐ 11"
b. ☐ is not required, as the application was filed in English.
c. ☐ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.
d. ☐ Translation verification attached (not required now).

11. ☒ **PLEASE AMEND** the specification before its first line by inserting as a separate paragraph:
a. ☒ --This application is the national phase of international application PCT/FI99/00652 filed August 5, 1999 which designated the U.S.--
b. ☐ --This application also claims the benefit of U.S. Provisional Application No. 60/ _____, filed _____ .--

12. ☐ Amendments to the claims of the International Application **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., before 18th month from first priority date above in item 3, are transmitted herewith (file only if in English) including:**

13. ☒ PCT Article 19 claim amendments (if any) have been transmitted by the International Bureau

14. ☐ Translation of the amendments to the claims **under PCT Article 19 (35 U.S.C. 371(c)(3)), i.e., of claim amendments** made before 18th month, **is attached (required by 20th month from the date in item 3 if box 4(a) above is X'd, or 30th month if box 4(b) is X'd, or else amendments will be considered canceled).**

15. **A declaration of the inventor** (35 U.S.C. 371(c)(4))
a. ☐ is submitted herewith ☐ Original ☐ Facsimile/Copy
b. ☒ is not herewith, but will be filed when required by the forthcoming PTO Missing Requirements Notice per Rule 494(c) if box 4(a) is X'd or Rule 495(c) if box 4(b) is X'd.

16. **An International Search Report (ISR):**
a. Was prepared by ☐ European Patent Office ☐ Japanese Patent Office ☒ Other
b. ☒ has been transmitted by the international Bureau to PTO.
c. ☒ copy herewith (2 pg(s).) ☒ plus Annex of family members (1 pg(s).).

17. **International Preliminary Examination Report** (IPER):
a. ☒ has been transmitted (if this letter is filed after 28 months from date in item 3) in English by the International Bureau with Annexes (if any) in original language.
b. ☒ copy herewith in English.
c.1 ☐ IPER Annex(es) in original language ("Annexes" are amendments made to claims/spec/drawings during Examination) including attached amended:
c.2 ☐ Specification/claim pages #_____ claims #
Dwg Sheets #
d. ☐ Translation of Annex(es) to IPER **(required by 30th month due date, or else annexed amendments will be considered canceled).**

18. **Information Disclosure Statement** including:
a. ☒ Attached Form PTO-1449 listing documents
b. ☒ Attached copies of documents listed on Form PTO-1449
c. ☒ A concise explanation of relevance of ISR references is given in the ISR.

19. ☐ **Assignment** document and Cover Sheet for recording are attached. Please mail the recorded assignment document back to the person whose signature, name and address appear at the end of this letter.

20. ☐ Copy of Power to IA agent.

21. ☐ **Drawings** (complete only if 8d or 10a(4) not completed): ___ sheet(s) per set: ☐ 1 set informal; ☐ Formal of size ☐ A4 ☐ 11"

22. Small Entity Status ⌀ ☒ is **Not** claimed ☐ is claimed (**pre-filing confirmation required**)
22(a) _____ (No.) Small Entity Statement(s) enclosed (since 9/8/00 Small Entity Statements(s) not essential to make claim)

23. **Priority** is hereby claimed under 35 U.S.C. 119/365 based on the priority claim and the certified copy, both filed in the International Application during the international stage based on the filing in (country) FINLAND of:

	Application No.	Filing Date		Application No.	Filing Date
(1)	981708	August 6, 1998	(2)		
(3)			(4)		
(5)			(6)		

a. ☒ See Form PCT/IB/304 sent to US/DO with copy of priority documents. If copy has not been received, please proceed promptly to obtain same from the IB.
b. ☐ Copy of Form PCT/IB/304 attached.

RE: USA National Filing of PCT/FI99/00652

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24. Attached:

25. **Preliminary Amendment:**

25.5 Per Item 17.c2, **cancel original** pages #_____, claims #_____, Drawing Sheets #

26. **Calculation of the U.S. National Fee (35 U.S.C. 371 (c)(1)) and other fees is as follows:**
Based on amended claim(s) per above item(s) ☐ 12, ☐ 14, ☐ 17, ☐ 25, ☐ 25.5 (hilite)

Total Effective Claims	minus 20 =	x $18/$9 =	$0	966/967
Independent Claims	minus 3 =	x $80/$40 =	$0	964/965
If any proper (ignore improper) Multiple Dependent claim is present,		add$270/$135	+0	968/969

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4)): →→ **BASIC FEE REQUIRED, NOW** →→→→

A. If country code letters in item 1 are **not** "US","BR","BB","TT","MX","IL" "NZ", "IN" or "ZA"

See item 16 re:

1.	Search Report was not prepared by EPO or JPO - - - - - - - - -	add$1000/$500		960/961
2.	Search Report was prepared by EPO or JPO - - - - - - - - - - -	add$860/$430	+1000	970/971

SKIP B, C, D AND E UNLESS country code letters in item 1 are "US","BR","BB","TT","MX","IL", "NZ", "IN" or "ZA"

→ (X) ☐	B. If USPTO did not issue both International Search Report (ISR) and (if box 4(b) above is X'd) the International Examination Report (IPER), -	add$970/$485	+0	960/961
(only) (one) → (of) ☐	C. If USPTO issued ISR but not IPER (or box 4(a) above is X'd), -	add$710/$355	+0	958/959
(these) (4) → (boxes) ☐	D. If USPTO issued IPER but IPER Sec. V boxes not all 3 YES, -	add$690/$345	+0	956/957
→ ☐	E. If international preliminary examination fee was paid to USPTO and Rules 492(a)(4) and 496(b) satisfied (IPER Sec. V all 3 boxes YES for all claims), - - - - - - - - - - - - -	add $100/$50	+0	962/963
27.		**SUBTOTAL =**	$1000	
28.	If Assignment box 19 above is X'd, add Assignment Recording fee of ----$40		+0	(581)
29.	Attached is a check to cover the -	**TOTAL FEES**	$1000	

Our Deposit Account No. 03-3975
Our Order No. 60258 (C#) | 276662 (M#)

00909

CHARGE STATEMENT: The Commissioner is hereby authorized to charge any fee specifically authorized hereafter, or any missing or insufficient fee(s) filed, or asserted to be filed, or which should have been filed herewith or concerning any paper filed hereafter, and which may be required under Rules 16-18 and 492 (missing or insufficient fee only) now or hereafter relative to this application and the resulting Official document under Rule 20, or credit any overpayment, to our Account/Order Nos. shown above for which purpose a duplicate copy of this sheet is attached.
This CHARGE STATEMENT does not authorize charge of the issue fee until/unless an issue fee transmittal form is filed

Pillsbury Winthrop LLP
Intellectual Property Group

By Atty: Richard C. Irving **Reg. No.** 38499

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Atty/Sec: RCI/mhn

NOTE: File in duplicate with 2 postcard receipts (PAT-103) & attachments.

Internet/intranet access mechanism

Background of the invention

The invention relates to a mechanism for accessing the Internet via an ATM (Asynchronous Transfer Mode) network. Within the context of this application, 'Internet' should be interpreted broadly to cover any large-area networks using Internet Protocols (IP). Especially it is the applicant's intention to include future developments, such as Internet 2 or NGI ('Next generation internet'), and corporate networks, commonly referred to as intranets or extranets.

A person designing an Internet access mechanism faces several issues, such as interoperability, security, billing, economic use of IP addresses, and how to make the best use of installed equipment, etc.

From references [1, Kwok et al.] and [2, Nilsson et al.] are known Internet access mechanisms for connecting each of several customer premises equipment (abbreviated "CPE") via an ATM network to one of several service providers (SP). The concept of service provider comprises Internet service providers (ISP), content providers (CP, for video-on-demand, etc.), and corporate network servers (CNS, for telecommuting, etc.)

Referring to Fig. 1, CPEs are connected to the ATM network at network termination points (NT). A typical NT, such as NT1 in Fig. 1, is a network gateway having a network interface for the customer's local area network, LAN, and another interface towards the ATM network. Alternatively, a personal computer PC or a workstation WS can be connected directly (without a LAN) to the ATM network by means of an ATM/ADSL adapter card (shown as NT2), which in this case is the NT. In both cases, there is a well-defined NT for each CPE (although one NT may serve several CPEs). According to both cited references, the network comprises an access server function, or ASF, having a connection to each NT and each SP such that each NT has a permanent connection or a permanent virtual connection to the ASF. The wording 'access server function' implies that the ASF can be a dedicated network element or it can be integrated into or co-located with another network element, such as an ATM switch. In the cited references, the ASF has been referred to as an 'access node'/'DSLAM' (digital subscriber line access multiplexer) or an 'edge router'. It should be noted that the difference between 'permanent connection' and 'permanent virtual connection' has become rather blurred and later in this application, only 'permanent virtual connection' (PVC) will be used.

A problem of the known Internet access mechanisms is that they do not give a satisfactory answer to following problem: How can a specific end-user be connected to the desired service provider with a minimal number of permanent virtual circuits (PVCs) with a possibility of end-user authentication taking place only at the ends of the PVCs (not necessarily at the ASF)?

Disclosure of the invention

An object of the invention is to solve or at least minimise the problem associated with the prior art access mechanisms. The object is achieved with a method and equipment which are characterized by what is disclosed in the attached independent claims. Preferred embodiments of the invention are disclosed in the attached dependent claims.

The invention is based on establishing a tunnelling protocol on the permanent virtual connection between each CPE or NT and the ASF, wherein the tunnelling protocol is able to support an integrated signalling protocol. Selecting an appropriate SP is based on the integrated signalling protocol. Routing to the selected SP is performed by the ASF. Finally, the ASF connects the CPE or NT to the selected SP using the integrated signalling protocol.

Within the context of this application, 'tunnelling protocol' refers to a protocol which allows creating and maintaining virtual private sessions via various network media such as IP, ATM, Frame Relay, etc. Correspondingly, 'integrated signalling protocol' (i.e. a signalling protocol integrated into the tunnelling protocol) refers to a control protocol which is used for creating, maintaining and releasing these sessions.

Implementation of the invention, however, raises two new issues: the ATM network must provide non-ATM functions in the ASF, and, unless properly dimensioned, the ASF can be a performance bottleneck. Such non-ATM functions performed by the ASF include functions above the ATM layer for the user connections, namely SAR/AAL5, the entire tunnelling protocol and selecting the SP by L2 signalling. These functions require appropriate administration. After a careful study of the pros and cons of the invention, it will be observed that there are situations where the advantages of the invention justify the added complexity of the ASF.

According to a preferred embodiment of the invention, one permanent virtual connection PVC is provided from the ASF to each SP. Alternatively, there is provided a pool of permanent virtual connections from the ASF to each SP. One PVC is allocated to each CPE from this pool. As a further op-

tion, it is possible to establish one switched virtual connection (SVC) from the ASF to each SP, on the basis of signalling which the ASF receives from the CPE via the tunnelling protocol.

The tunnelling protocol can be established only in response to detecting appropriate user activity in a CPE. Alternatively, the tunnelling protocol can be permanent and the integrated signalling is initiated and the user is authenticated only in response to detecting appropriate user activity in the CPE. According to a further preferred embodiment, the user is authenticated twice, first by the ASF using the tunnelling protocol, and then by the SP.

Brief description of the drawings

The invention will be described in more detail by means of preferred embodiments with reference to the appended drawing in which:

Fig. 1 is a block diagram illustrating the Internet/intranet access mechanism according to the invention.

Detailed description of the invention

Fig. 1 a is block diagram comprising several customer premises equipment CPE, connected via network termination points NT to an access server function ASF according to the invention. The ASF can be a dedicated network element, or it can be integrated into or co-located with another network element, such as an ATM switch (which is known to a skilled person and not shown separately).

The ASF provides access from each CPE to several service providers SP, such as Internet service providers ISP, content providers CP and corporate networks CN. The invention requires no changes to the construction or operation of the SP equipment. Instead, the invention can be implemented in the ASF and the NT. There is preferably one permanent virtual connection (PVC) between each NT and the ASF.

In the embodiment shown in Fig. 1, there is one PVC from NT2 (in the workstation WS) to the ASF. Also, assuming that at least one of the personal computers PC is active, there is also a PVC from NT1 to the ASF. All the personal computers PC connected to the LAN share the PVC between NT1 and the ASF. According to a preferred embodiment of the invention, there is a tunnelling protocol, such as L2TP (Layer 2 Tunnelling Protocol), on the PVC from each active PC to the NT. The tunnelling protocol combines the sessions and signalling from all active PCs into a single tunnel from the NT to the ASF.

The tunnelling protocol must be able to support an integrated signalling protocol. The end user (i.e. the person using the CPE or a software agent being executed in the CPE) selects an appropriate SP by using the integrated signalling protocol. Routing to the selected SP is performed by the ASF. Finally, the ASF connects the CPE or NT to the selected SP using the integrated signalling protocol.

Reference 11 points to a preferred protocol stack at the NT and reference 12 points to a preferred protocol stack at the ASF. (The workstation WS connected to NT2 without a LAN needs a simpler protocol stack, consisting only of the right half of the protocol stack 11, i.e. PPP, L2TP, AAL5, ATM, and PHY.) Having point-to-point connectivity PPP over L2TP provides end-to-end security. In other words, it is not necessary for the ASF to authenticate the user, although the ATM operator may still choose to do so, in order to charge the subscriber for the duration of the session. However, even in this case, the end-user's choice of SP is not known to the ATM operator, which is a clear benefit to the owners of the SPs.

The preferred embodiment saves a considerable amount of PVCs over the prior art access mechanisms. Let us calculate an example case of 10 000 customers and 8 SPs and 20 ASFs (one ASF per 500 CPE). If all customers need access to all SPs, the prior art access mechanisms require a separate PVC for each customer/SP combination, i.e. in this example 8 * 10 000 = 80 000 PVCs. In comparison, the mechanism according to the invention requires a PVC only for each customer and each ASF/SP combination, i.e. 10 000 + 8*20 = 10 160 PVCs. (This number is not perfectly accurate since some ASF/SP connections can be switched virtual connections, SVC.)

According to an alternative embodiment of the invention, there is a separate PVC from each active PC between the NT and the ASF. In this case, implementation of the NT is easier because the tunnels from the PCs do not have to be combined (instead, all tunnels pass from the PCs, over the LAN, through the NT to the ASF).

The ATM operator's billing can be based on the time there is a PVC between the customer and the ASF. The invention simplifies this kind of billing because there is only one PVC from each customer. Also, when the customer changes the SP, a new PVC configuration is not needed.

Configuring and managing the NT device according to the invention, like the device itself, is rather simple. Only its LAN interface and its ATM

interface require configuration: an IP address, a subnet mask and an ATM PVC. The latter can be received automatically, using a technique known as ILMI (Interim Local Management Interface) as defined by ATM Forum UNI (User to Network Interface) 3.1. ILMI supports bidirectional exchange of management information between UNI management entities related to the ATM layer and physical layer parameters. Correspondingly, the LAN interface can be configured automatically by a process known as DHCP (Dynamic Host Configuration Protocol), as defined by the Internet Software Consortium.

The description only illustrates preferred embodiments of the invention. The invention is not, however, limited to these examples, but it may vary within the scope of the appended claims.

References:

1. Kwok, Timothy et al: *An Interoperable End-to-End Broadband Service Architecture over ASDL Systems*, version 1.0, 3 June, 1997, available at address http://www.3com.com/xdsl/microwt.html at the priority date of this application.

2. Nilsson, Patrik et al: *Anx -- High-speed Internet Access*, available at address http://www.ericsson.com/Review/er1b_98/art4/art4.html at the priority date of this application. The www address implies that reference 2 was printed in Ericsson Review magazine.

Both cited references are incorporated herein by reference.

Claims

1. A method for connecting one of several customer premises equipment, or CPE, via an ATM network to one of several service providers, or SPs, said method comprising:

connecting each CPE to the ATM network via a corresponding network termination point, or NT; and

forming an access server function, or ASF, having a permanent virtual connection to each NT and a connection to each SP;

characterized in that

a tunnelling protocol is established on said permanent virtual connection between each NT and said ASF, said tunnelling protocol being able to support an integrated signalling protocol;

the CPE or its user selects an appropriate SP by using said integrated signalling protocol;

routing from said CPE to said selected SP is performed by said ASF; and

said ASF connects the CPE to the selected SP using said integrated signalling protocol.

2. A method according to claim 1, characterized by providing one permanent virtual connection from the ASF to each SP.

3. A method according to claim 1, characterized by providing a pool of permanent virtual connections from the ASF to each SP; and allocating one connection to each NT from said pool.

4. A method according to claim 1, characterized by establishing one switched virtual connection (SVC) from the ASF to each SP, on the basis of signalling which the ASF receives from said CPE via said tunnelling protocol.

5. A method according to claim 1, characterized by establishing said tunnelling protocol only in response to detecting appropriate activity in said CPE.

6. A method according to claim 1, characterized by establishing said tunnelling protocol permanently and initiating said integrated sig-

nalling and authenticating the user of said CPE only in response to detecting appropriate activity in said CPE.

7. A method according to claim 1, characterized by authenticating the user of said CPE both by said ASF and by the selected SP.

8. A network element (ASF) providing an access server function for connecting each of several customer premises equipment, or CPE, via an ATM network to one of several service providers, or SPs, said network element comprising:

interface means to several network termination points, or NTs for connecting each CPE to the ATM network via a corresponding NT; and

interface means to each SP for providing a permanent virtual connection or a switched virtual connection thereto;

characterized in that the network element is arranged to:

use a tunnelling protocol on said permanent virtual connection between itself and each NT, said tunnelling protocol being able to support an integrated signalling protocol;

select an appropriate SP in response to signalling from each CPE or its user, said selecting being carried out using said integrated signalling protocol;

support routing from each CPE to said selected SP; and

connect each CPE to the selected SP using said integrated signalling protocol.

9. A network element (ASF) according to claim 8, characterized in that it is arranged to provide one permanent virtual connection from itself to substantially each SP.

10. A network element (ASF) according to claim 8, characterized in that it is arranged to provide a pool of permanent virtual connections from itself to each SP and to allocate one connection to each active NT from said pool.

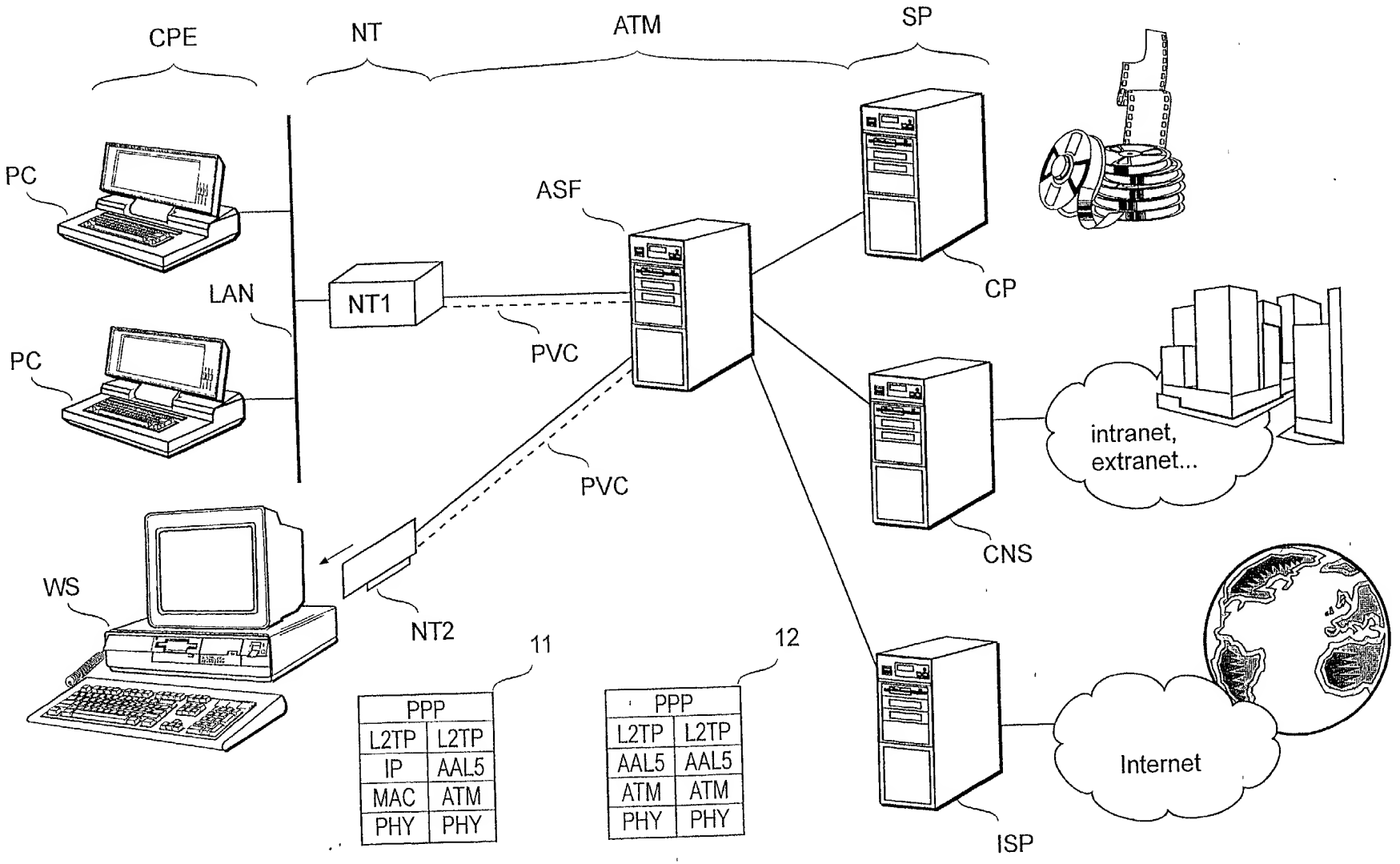
11. A network element (ASF) according to claim 8, characterized in that it is arranged to provide a switched virtual connection from itself to at least one SP.

12. A network element (ASF) according to claim 8, characterized in that it is arranged to provide a separate tunnel from itself to substantially each CPE.

13. A network element (ASF) according to claim 8, characterized in that it is arranged to cooperate with an NT between itself and each CPE,

said NT being arranged to provide a separate tunnel from itself to substantially each CPE and to combine the separate tunnel into fewer tunnels, preferably a single tunnel, from itself to the ASF.

Fig. 1



FOR UTILITY/DESIGN
- CIP/PCT NATIONAL/PLANT
ORIGINAL/SUBSTITUTE/SUPPLEMENTAL
DECLARATIONS

RULE 63 (37 C.F.R. 1.63)
DECLARATION AND POWER OF ATTORNEY
FOR PATENT APPLICATION
IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

PM & S
FORM

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name, and I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the INVENTION ENTITLED

Internet/Intranet access mechanism

the specification of which (CHECK applicable BOX(ES))

X → A. ☐ is attached hereto.

BOX(ES) → B. ☐ was filed on _____ as U.S. Application No. _____ /

→ C. ☒ was filed as PCT International Application No. PCT/FI99 / 00652 ✓ on 5 August 1999 ✓

and (if applicable to U.S. or PCT application) was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56. I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT International Application which designated at least one other country than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT International Application, filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing date of this application:

PRIOR FOREIGN APPLICATION(S) Number	Country	Day/MONTH/Year Filed	Date first Laid-open or Published	Date Patented or Granted	Priority Claimed Yes	No
981708 ✓	FI ✓	6 August 1998 ✓			X	

I hereby claim domestic priority benefit under 35 U.S.C. 119(e) or 120 and 365(c) of the indicated United States applications listed below and PCT international applications listed above or below and, if this is a continuation-in-part (CIP) application, insofar as the subject matter disclosed and claimed in this application is in addition to that disclosed in such prior applications, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in 37 C.F.R. 1.56 which became available between the filing date of each such prior application and the national or PCT international filing date of this application:

PRIOR U.S. PROVISIONAL, NONPROVISIONAL AND/OR PCT APPLICATION(S) Application No. (series code/serial no.)	Day/MONTH/Year Filed	Status pending, abandoned, patented	Priority Claimed Yes	No

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint Pillsbury Madison & Sutro LLP, Intellectual Property Group, 1100 New York Avenue, N.W., Ninth Floor, East Tower, Washington, D.C. 20005-3918, telephone number (202) 861-3000 (to whom all communications are to be directed), and the below-named persons (of the same address) individually and collectively my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith and with the resulting patent, and I hereby authorize them to delete names/numbers below of persons no longer with their firm and to act and rely on instructions from and communicate directly with the person/assignee/attorney/firm/ organization who/which first sends/sent this case to them and by whom/which I hereby declare that I have consented after full disclosure to be represented unless/until I instruct the above Firm and/or a below attorney in writing to the contrary.

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(1) INVENTOR'S SIGNATURE: _____ Date: 19 / 2001

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(FOR ADDITIONAL INVENTORS, check box ☒ to attach PAT 116-2 same information for each re signature, name, date, citizenship, residence and address.)

DECLARATION AND POWER OF ATTORNEY
(continued)
ADDITIONAL INVENTORS:

3-00

(3) INVENTOR'S SIGNATURE: KNy Date: 15.12.00

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Residence City	State/Foreign Country	Country of Citizenship
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(4) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	

(5) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	

(6) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	

(7) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	

(8) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	

(9) INVENTOR'S SIGNATURE: Date:

First	Middle Initial	Family Name

Residence City	State/Foreign Country	Country of Citizenship

Post Office Address (include Zip Code)	